The National DNA Data Bank of Canada

Annual Report • 2003-2004

National Police Services

Canada

Cover Image: In their Ottawa laboratory, NDDB analysts process DNA using a robotic workstation. Photo: Dr. Ron Fourney

www.nddb-bndg.org

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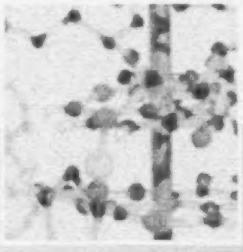


MESSAGE FROM THE COMMISSIONER OF THE ROYAL CANADIAN MOUNTED POLICE

I am pleased to present the fourth Annual Report for Canada's National DNA Data Bank (NDDB). Another year of milestones and accomplishments in the NDDB has resulted in more crimes solved through the use of DNA technology than ever before.

Commissioner G. Zaccardelli
Royal Canadian Mounted Police

Canada's NDDB provides the law enforcement community with a sophisticated, cost-effective forensic tool to help identify suspects, protect the innocent, and narrow the time and focus of criminal investigations. The number of matches made by the NDDB demonstrates the effectiveness of this tool in solving crime.

Police services across Canada, regardless of size or location, access the NDDB, making it a model of seamless service delivery, and intelligence and information sharing. It is an important contributor to the RCMP's goal of providing safe homes and safe communities for Canadians.

Through the RCMP's agreement with Interpol, the NDDB is also having a positive impact on global law enforcement. Criminal activity is not limited by geographic or jurisdictional boundaries, making information sharing with our national and international partners more critical than ever before. This information sharing yielded the NDDB's first international DNA match with the United States in 2003. This match resulted in the deportation of a convicted offender from Canada for trial on sexual assault and murder charges in the United States.

The protection of personal privacy is a key consideration of the NDDB, which permits access to information only to those with a specific and legal right to do so. DNA profiles in the Data Bank are used only for the purpose for which they were collected.

The constitutionality of collecting DNA samples from convicted offenders has been challenged in Canadian courts on several occasions, but the judicial system has upheld the provisions. The judgments recognize the great care being taken to balance the use of DNA profiles to detect, arrest, and convict offenders with the legitimate interests of convicted offenders to protect their personal information.

MESSAGE FROM THE CHIEF, NATIONAL POLICE SERVICES

As Chief, National Police Services (NPS), I am proud of the accomplishments of the National DNA Data Bank as documented in this fourth Annual Report.

Assistant Commissioner
JAJ (Mike) Buisson
Chief, National Police Services

NPS has a comprehensive array of programs and services that support the law enforcement community in preventing and solving crime across Canada and beyond. The Data Bank has proven to be one of our most definitive investigative tools, as evidenced by the number of matches made between crime scenes and convicted offenders in the past year.

A notable achievement in 2003-2004 was the one thousandth crime scene to convicted offender match. As of May 14th, 2004, that total has almost doubled to 1,872 matches.

After four years of operation, we are able to confirm that sample volumes play a pivotal role in forecasting success rates. It is a simple formula. The more profiles entered into the National DNA Data Bank, the more "hits" that are generated to help police investigators solve serious crimes.

Furthermore, statistics show that offenders are often involved in more than one offence or type of offence. Every DNA profile from someone convicted of a secondary offence (e.g. break and enter) increases the prospect of linking it to a primary offence which is generally a more serious crime (e.g. homicide, assault).

The success of the NDDB after only four years of operation has drawn forensic colleagues in other countries to look to us for best practices in DNA technology. Leaders in world-class DNA research and technology, our scientists and technologists continually strive to identify the most exacting techniques to collect, extract, process and analyze DNA samples.

Robotic processing and patented sample collection kits are examples of the innovation found at the NDDB. These innovations are driven by a desire to strengthen the ability of our law enforcement and criminal justice partners to solve criminal cases.

The momentum towards improved service delivery continues and I am confident that the future will see more crimes solved, more suspects identified and brought to trial, and ongoing protection of the innocent.

MESSAGE FROM THE ASSISTANT COMMISSIONER, FORENSIC LABORATORY SERVICES

The success of the National DNA Data Bank continues to be a source of tremendous pride for the Forensic Laboratory Services (FLS), the National Police Services and for the police community as a whole.

FLS operates from six delivery sites, with forensic laboratories in Vancouver, Edmonton, Regina, Winnipeg, Ottawa and Halifax. It also maintains the National DNA Data Bank.

In addition to the more than 1,800 offender hits, the NDDB has tied more than 180 hits through the crime scene index. These are serious, violent crimes like murder and sexual assault that are linked to the same offender. This provides key information that enables our police partners to pursue a focused investigation.

In this report, you'll find several recent examples where a forensic hit from the Data Bank has provided police with information they simply could not have uncovered in any other way.

One of the highlights this year has been the enhanced integration of the National DNA Data Bank analytical capacity with the operational Biology Unit of the Forensic Laboratory Services for analysis of high volume crimes such as break and enter. A close working relationship between FLS and Data Bank scientists has generated critical information for almost 50 police investigations.

The NDDB's effectiveness is due, in large part, to the fact that it does not function as an entity unto itself. Rather, it identifies offender and crime scene hits that are then passed on to colleagues in FLS and our partner forensic laboratories: Laboratoire de sciences judiciaires et de médecine légale (Montréal, Quebec) and the Centre of Forensic Sciences (Toronto, Ontario) for the operational follow-up that confirms the results for the investigating police agency.

As we look ahead, our focus is on preparation for the 2005 Parliamentary review of the DNA Identification Act and the operation of the NDDB.

We will be gathering all of the information and data necessary to assist Parliamentarians in their work.

J.L. Buckle
Assistant Commissioner
Forensic Laboratory Services

I have no doubt that we will be able to demonstrate that the National DNA Data Bank is an enormous success and a very powerful tool for the law enforcement community.

Ultimately, the science is helping to make our communities safer.

EXECUTIVE SUMMARY

DNA is the fundamental building block for our entire genetic makeup. With the exception of identical twins, each person's DNA is unique. Highly discriminating, it's a powerful tool for identifying individuals.

Using modern technology, DNA can be extracted from a small biological sample, such as a few drops of blood, the root of one hair, or by swabbing the inside of the mouth. This sample can then be analyzed, creating a DNA profile that can be used to identify a person.

That profile, in turn, can be compared to an unknown DNA profile drawn from a different biological sample. If the profiles match, the two samples come from the same person (or identical twins). If the profiles do not match, the samples come from different people.

It was just 15 years ago when forensic DNA evidence was first used to secure a criminal conviction in a Canadian court. Today, DNA evidence is universally regarded as scientifically valid.

And, after just four years in operation, the National DNA Data Bank is now one of the most powerful investigative tools available to the law enforcement and justice communities. Biological samples collected from a crime scene can either link a suspect to that scene, or rule the suspect out. Evidence from different crime scenes can be compared to link the same perpetrator to multiple offences, whether the crimes took place locally, across the country or halfway around the world.

Highlights from 2003-04

The National DNA Data Bank achieved an important milestone this year, surpassing 1,000 "hits".

An offender "hit" occurs when a DNA profile generated from a crime scene sample is sent to the NDDB and it matches that of an individual included in the Convicted Offender Index (COI).

A forensic "hit" occurs when a crime scene DNA profile is sent to the Crime Scene Index (CSI) and matches another profile from at least one other crime scene.

As of May 14th, 2004, Data Bank scientists have generated more than 1,800 hits, providing investigative leads in 131 murders and 336 sexual assaults.

To date, the NDDB has processed more than 59,000 DNA profiles from convicted offenders, along with almost 15,000 profiles from crime scenes. (In October, 2003, the Supreme Court of Canada confirmed that police have the right to force suspected criminals to give up samples of blood, hair or buccal for DNA analysis. The unanimous ruling marked the first time that Canada's highest court had pronounced on the constitutionality of Canadian legislation allowing police to pursue DNA warrants).

The Data Bank employed 26 full-time staff in 2003-04, with a total operating budget of almost $2.6 million.

As of May 14th, 2004, Data Bank scientists have generated more than 1,800 hits, providing investigative leads in 131 murders and 336 sexual assaults.

Priorities for 2004-05

A key factor in the NDDB's success is also its greatest challenge: increasing the population of the Crime Scene Index and the Convicted Offender Index.

For that to happen, the NDDB must continue to focus on education and communication. Together with legal, government and police partners, the message is getting out that the NDDB is capable of handling tens of thousands of samples a year.

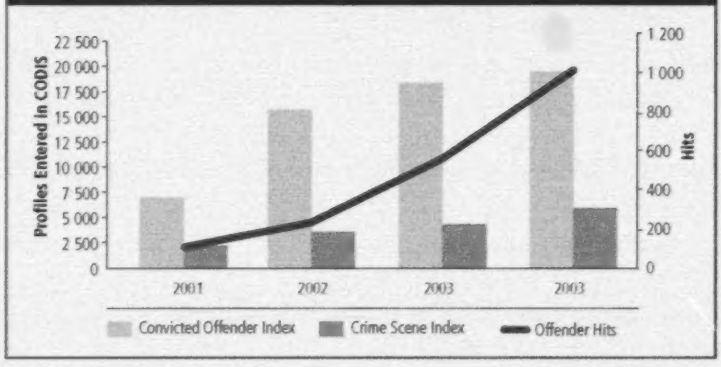
There is a simple equation at the core of this priority: as more samples enter the Data Bank, there is a corresponding increase in the number of convicted offender and crime scene hits.

Consider these recent results: between May 15th, 2003 and May 14th, 2004, there was a 50 per cent increase in the number of profiles entered into the two Data Bank indices. Those additional profiles boosted the number of offender hits by a remarkable 140 per cent!

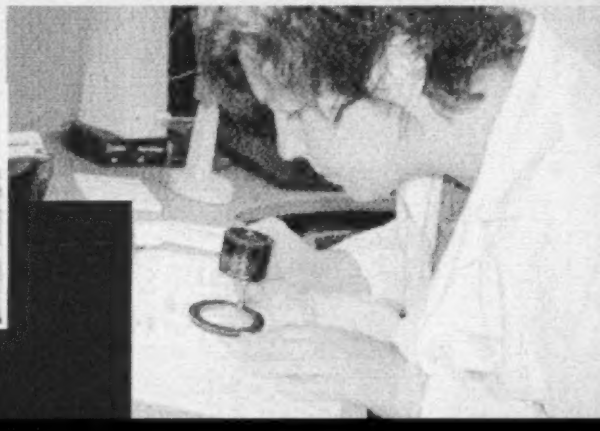
Other priorities include:

- Expanding the use of automation to boost both the volume of samples processed and the speed at which they are handled;
- Encouraging and supporting break and enter sample addition into the Crime Scene Index. There is strong evidence linking the perpetrators of these crimes with other more serious offences such as murder and sexual assault. DNA profiling that is used to solve break-and-enter investigations may link perpetrators to unsolved serious crimes; and
- Preparing for the Parliamentary review in 2005, as required under the federal legislation that created the Data Bank.

SAMPLE INPUT AND OFFENDER HITS



In Canada and abroad, the power of forensic DNA, the collaboration of many partners, and the professionalism of NDDB personnel have combined to solve scores of complex criminal cases. As awareness increases and technology improves, the success stories will multiply to the benefit of us all.



DNA 101

What is DNA? Deoxyribonucleic acid (DNA) is a long, double-stranded molecule that looks like a twisted rope ladder or double helix.

Sometimes referred to as the blueprint of life, DNA is the fundamental building block for your entire genetic makeup.

When sperm and egg unite, equal amounts of DNA from your mother and father come together. DNA is found in virtually every tissue in the human body. The DNA in your blood is the same as the DNA in your skin cells, saliva and the roots of your hair.

Highly discriminating, DNA is a powerful tool for identifying individuals. With the exception of identical twins, each person's DNA is unique to them. Only a very small amount of blood or semen is required to identify an individual.

Using modern technology, DNA can be extracted from a small biological sample, such as a few drops of blood. This sample is then analyzed, creating a DNA profile that can be used to identify a person. A DNA profile, drawn from a known biological sample, can be compared to an unknown DNA profile drawn from a different biological sample. If the profiles match, the two samples come from the same person (or identical twins). If the profiles do not match, the samples come from different people.

The value of DNA to police investigations is enormous. Biological samples collected from a crime scene can either link a suspect to the scene, or rule the suspect out as the donor of the DNA. Evidence from different crime scenes can be compared to link the same perpetrator to multiple offences, whether the crimes took place locally, across the country, or halfway around the world. It can also identify a victim of crime or of mass disaster through DNA profiles developed from biological relatives or from the victim's personal effects.

The DNA molecule is very stable. Over time, it can withstand significant environmental or man-made impacts. Biological samples can be developed into DNA profiles from evidence that is decades old. The stability of the molecule, combined with the discriminating features of each individual's DNA and the accuracy of current DNA analysis techniques, makes DNA evidence an extremely reliable forensic tool.

Creating a National DNA Data Bank

In 1989, DNA analysis was first used by the Royal Canadian Mounted Police (RCMP) in an investigation in which a suspect denied any involvement in a sexual assault, but the victim identified him as the attacker (see DNA in Court, page 37).

Crime scene photo provided by Ontario Police College Forensic Identification Unit.

DNA analysis later confirmed the victim's story. After the DNA test results were presented in court, the suspect changed his plea to guilty.

Although the RCMP started using DNA analysis in 1989 there was, at this early stage, no central coordination at the national level that could help police take full advantage of the unfolding advances in DNA technology.

In 1995, the Criminal Code was amended to add DNA warrant provisions. Under these provisions, a provincial court judge may authorize the taking of a DNA sample from a suspect for the purpose of forensic DNA analysis in the course of the police investigation of a designated *Criminal Code* offence.

In order for this new tool to be used to its full potential, there was a need to coordinate DNA profiling data from investigations across the country. With support from all levels of government, the general public and police agencies throughout Canada, decisive steps were taken to create the National DNA Data Bank.

In 1996, the Department of the Solicitor General (as it was called then) and the Department of Justice undertook consultations across Canada regarding the establishment of a national DNA data bank.

The following groups participated in these consultations:

- Provinces and territories
- Police associations
- Privacy officials
- Bar associations
- Victim advocates
- Women's groups
- Correctional officials
- Medical and scientific organizations

Confirming the Government of Canada's commitment to combat crime – especially violent crime – Bill C-3, the *DNA Identification Act* (S.C. 1998 c.37) received Royal Assent on December 10, 1998, and was proclaimed in force on June 30th, 2000. That same year, Parliament enacted Bill S-10, *An Act to amend the National Defence Act*, the *DNA Identification Act*, and the *Criminal Code* (S.C. 2000, c.10).

The RCMP then built the National DNA Data Bank and made it operational within 18 months from Bill C-3 receiving Royal Assent. The project was completed on time and under budget.

The National DNA Data Bank (NDDB)

The NDDB is a component of the National Police Services, administered by the RCMP for the benefit of the entire Canadian law enforcement community. It currently employs 26 people and operated over the last fiscal year on a budget of approximately $2.6 million.

When the NDDB reaches full capacity – 30,000 convicted offender samples per year – it is expected the number

The value of DNA to police investigations is enormous. Biological samples collected from a crime scene can either link a suspect to the scene, or rule the suspect out as the donor of the DNA.

of staff will expand to 33 and the annual budget will be in the range of $3 million to $5 million.
The Data Bank serves three forensic lab partners across Canada: the RCMP, with facilities in Ottawa, Edmonton, Vancouver, Regina, Halifax and Winnipeg; the Centre of Forensic Sciences in Toronto; and, Montréal's Laboratoire de sciences judiciaires et de médecine légale.

Biological samples from convicted offenders are processed by NDDB analysts into DNA profiles which are then entered into the Convicted Offender Index. The Data Bank also contains the Crime Scene Index (CSI), a separate electronic data base composed of DNA profiles from crime scene evidence. These profiles are submitted by our regional forensic laboratory partners.

The Role of the National DNA Data Bank

The NDDB assists law enforcement agencies in solving crimes by:

- Linking crimes together where there are no suspects;
- Helping to identify suspects;
- Eliminating suspects where there is no match between crime scene DNA and a profile in the NDDB; and,
- Determining whether a serial offender is involved.

The National DNA Data Bank improves the administration of justice by ensuring that those who commit serious crimes are identified more quickly across all police jurisdictions in Canada while ruling out the innocent.

Thousands of police officers across Canada have been trained to collect DNA samples, which are then forwarded to the National DNA Data Bank for analysis. As of May 14th, 2004, there have been 59,008 DNA profiles from convicted offenders processed and added to the NDDB, along with 14,735 profiles from crime scenes.

Cutting Edge Technology

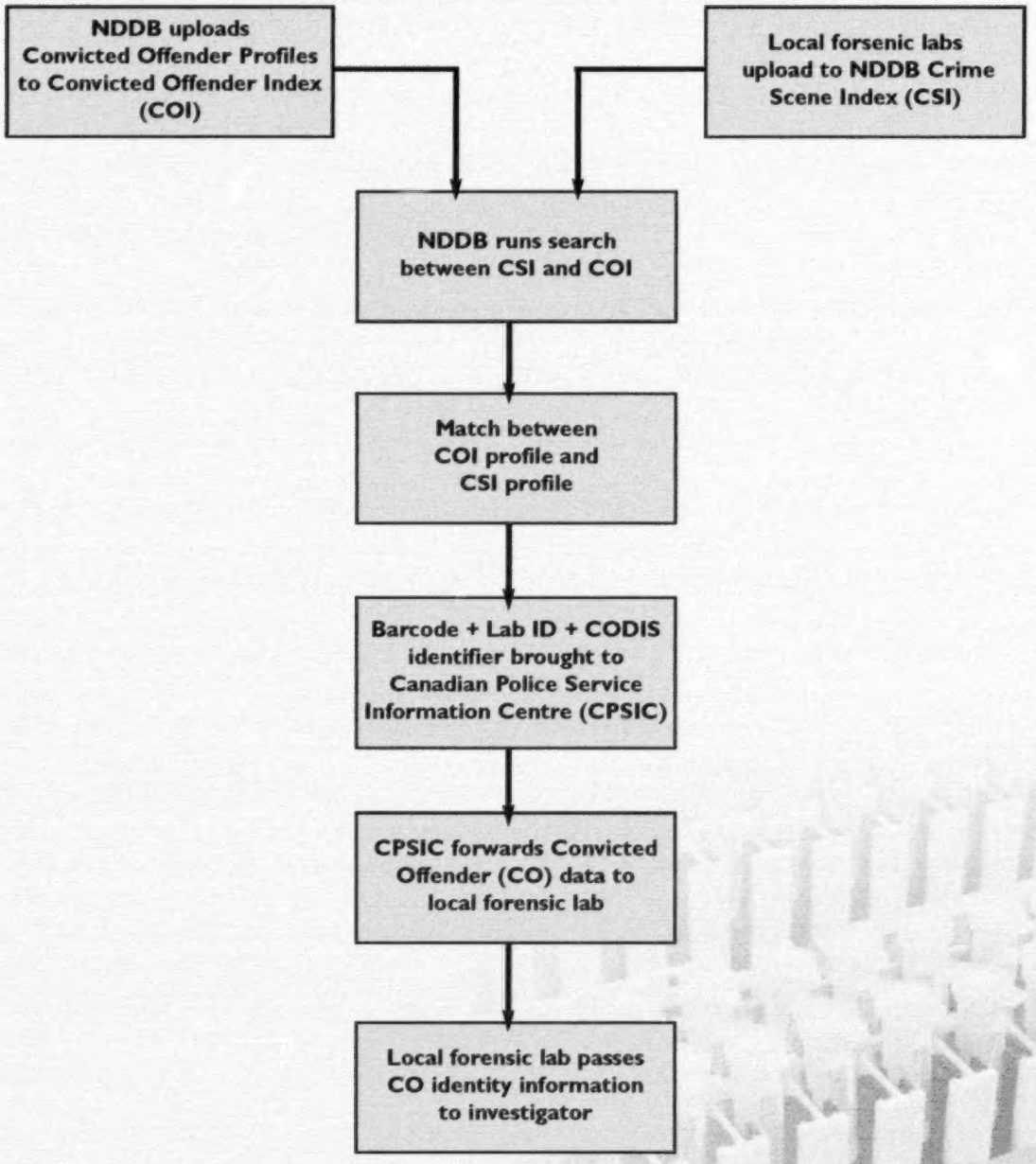
Canada's National DNA Data Bank relies heavily on robotic technology to dramatically speed up the processing and analysis of DNA samples. The robotics, combined with a world-class inventory and sample tracking system, allow NDDB personnel to process more samples in less time and at a significantly lower cost than other facilities around the world. The specialized sample tracking and control system (STaCS™) also protects the privacy of the individual and ensures security of the data.

Protecting Privacy

Every effort has been made to balance an offender's right to privacy with the need for police officers to identify suspects. Consistent with the DNA Identification Act, the RCMP has imposed strict procedures governing the handling of DNA profiles and biological samples to ensure that privacy interests are protected. Information collected by the NDDB is used strictly for law enforcement purposes.

A National DNA Data Bank Advisory Committee has also been established to advise the Commissioner of the RCMP on matters relating to the establishment and operation of the NDDB. These matters are consistent with the requirements of the DNA Identification Act regarding privacy, legal, ethical and human rights issues.

PROCESS FOR REPORTING MATCHES: CONVICTED OFFENDER PROFILE TO CRIME SCENE PROFILE


NDDB uploads Convicted Offender Profiles to Convicted Offender Index (COI)
Local forsenic labs upload to NDDB Crime Scene Index (CSI)
NDDB runs search between CSI and COI
Match between COI profile and CSI profile
Barcode + Lab ID + CODIS identifier brought to Canadian Police Service Information Centre (CPSIC)
CPSIC forwards Convicted Offender (CO) data to local forensic lab
Local forensic lab passes CO identity information to investigator

DNA IN COURT

Today, the power of DNA evidence to convict the guilty and protect the innocent is so well entrenched that we almost take it for granted.

It's remarkable, then, to realize it was only 15 years ago that DNA typing methods were introduced in criminal investigations and trials in Canada.

It was 1989 when DNA evidence was first used to secure a criminal conviction in a Canadian court. It was the decisive factor that eventually solved a vicious sexual assault. The conviction in that case was a huge victory for police, the Crown Attorney and the victim.

Even more important, the "McNally Case" marked a dramatic transformation that has changed the way that serious offences are investigated and prosecuted in Canada.

Nightmare Attack

The case involved a vicious attack on an elderly woman. She was sexually assaulted in her Ottawa home in the middle of the night. Given the traumatic nature of the attack and the fact that it took place in complete darkness, the identification of the assailant was fraught with difficulty.

A suspect was eventually arrested and the case went to trial. The accused maintained his innocence throughout the investigation and entered a plea of not guilty. Without a major break in the case, the prospects for conviction appeared slim, at best.

Fighting the uphill battle was Crown Attorney, Hilary McCormack. She had been following developments in the United States, where two private companies had started conducting DNA testing on behalf of police agencies.

"Before studying law, I had majored in genetics and biochemistry, so I had a pretty good sense of the potential value of DNA in forensic applications," says McCormack, who now heads up the Ottawa Crown Attorney's Office.

Exhibits from the crime scene were being bundled up to be sent to one of the private U.S. labs when McCormack received a call from the head of the RCMP's Forensic Laboratory in Ottawa, offering to conduct the DNA typing. "There were obvious benefits to having the analysis done locally," adds McCormack. "It was going to be far less expensive and would also give the RCMP an opportunity to enhance their knowledge and expertise in this new field."

RCMP forensic scientists were able to match the DNA from the crime scene with that of the accused. "We knew this was potentially precedent setting," notes McCormack, "So we had to present the evidence in such a way that the judge and jury would understand the science and would find our conclusions to be credible and compelling."

Ground-breaking Testimony

McCormack knew the risks. DNA typing was a brand new concept and highly complex. She knew the science and the statistics could very well confuse the jury and hamper the prosecution.

At that time, courts were familiar with blood type matches. For example, 42 per cent of the population has Type A blood. If a blood sample from the crime scene matched that of the accused, then it was one piece of evidence supporting the prosecution, although it was never compelling enough to stand up on its own.

DNA typing produced dramatically different results. McCormack's challenge was to convey how this scientific approach could narrow the odds to 1 in several billion.

With the help of a molecular biologist and a population geneticist, she laid out her case. Expert witnesses spent hours preparing for their testimony. Graphs and charts were created to help the jury better visualize how DNA typing fit into the Crown Attorney's case.

"I felt like we'd done a pretty good job presenting the DNA evidence," recalls McCormack. "But I wasn't prepared for what happened next."

Surprise Development

Defense counsel asked the judge for a recess. McNally, who had steadfastly maintained his innocence, needed a moment to confess to his wife that he was, in fact, the man responsible for the vicious attack. When he returned to the courtroom, McNally changed his plea to "guilty" and was subsequently convicted.

McCormack remembers the reaction. "There was enormous excitement amongst crown attorneys. Even then, I think we all recognized the enormous potential of DNA typing to ensure the proper administration of justice."

To the RCMP and the forensic community, this became an historical precedent marking the first time that a police laboratory had developed and presented its own DNA evidence in a North American court.

Defense counsel had the opposite reaction, however, and the science was hotly disputed for the next decade in courtrooms across the country.

"There was so much controversy and there were so many different opinions through much of the early 90's," recalls McCormack. "We really have come a long way in just 15 years. DNA evidence is so well accepted that we forget the huge hurdles we had to overcome."

SUPREME COURT UPHOLDS SEIZURE OF DNA SAMPLES

On October 31st, 2003, the Supreme Court of Canada in *R. v. S.A.B.* [2003], 2 S.C.R. 2003 60 (SCC) ruled unanimously that seizing bodily samples from a suspect for DNA analysis (pursuant to a DNA Warrant issued under the *Criminal Code*) does not violate the suspect's constitutional rights against unreasonable search and seizure.

"The factors that favour the importance of the search for truth ...outweigh the factors that favour protecting the individual against undue compulsion by the state," Justice Louise Arbour wrote in the Court's ruling. "On balance, the law provides for a search and seizure of DNA materials that is reasonable."

In her ruling, Justice Arbour noted that taking DNA samples by a mouth swab, hair sample or pin-prick to the finger is only minimally invasive.

The case dated back to 1996, when a 14-year-old Alberta girl was sexually assaulted by a man who was boarding with her family. The victim became pregnant and had an abortion.

Police took fetal tissue as evidence then obtained a warrant to collect a blood sample from the suspect by pricking his finger. Police linked the man to the sexual assault by comparing the DNA from his blood sample with the fetal tissue. He was convicted in March, 1999.

The police may seek DNA warrants in the course of investigating designated offences. A provincial court judge can authorize the taking of a DNA sample only if:

1. there are reasonable grounds to believe that a bodily substance has been found at a crime scene;
2. that the suspect was a party to the offence; and,
3. that DNA analysis will determine the suspect was the source of that bodily substance.

If the analysis links the suspect to the crime scene, then the DNA analysis can be used by the Crown at trial.

The Court found that DNA evidence is highly reliable and has enormous power as an investigative tool, both to convict the guilty and to exonerate the innocent.

PROTECTING PRIVACY

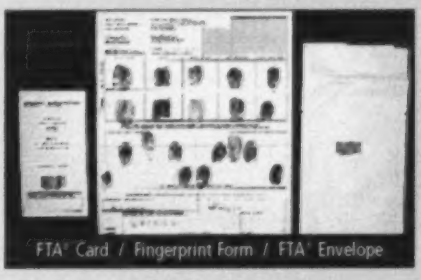
Personal information is collected on the fingerprint form. On the separate FTA® card*, a biological sample (blood, buccal or hair) is collected, along with another set of fingerprints.

Fingerprint Form

FTA® Card

Inside FTA® Card

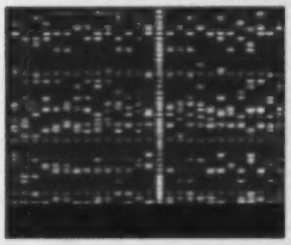
There is no personal information on the FTA® card. The fingerprint form is linked to the FTA® card by a unique bar code. This approach secures the data and protects the privacy of the individual.


FTA® Card / Fingerprint Form / FTA® Envelope

When the NDDB receives the kit, the fingerprints on the FTA® card are matched to the fingerprint form and the donor is verified. The bar code number is logged into the NDDB.

The FTA® card is separated from the personal information

The biological sample is sent to the laboratory for DNA analysis and the profile is entered into the NDDB.



The fingerprint form is sent to the Information and Identification Services and logged onto the system.

**FTA® paper is impregnated with special chemicals that preserve and protect the biological sample (DNA) while neutralizing harmful bacteria and viruses. The samples can be safely collected and efficiently processed with automation while enabling long-term storage at room temperature.*

THE WORKING SCIENCE

The **Convicted Offender Index (COI)** is the electronic DNA profile database developed from biological samples collected from:

1. Offenders convicted of designated primary and secondary offences (see *Appendices A and B*) identified in section 487.04 of Canada's *Criminal Code*, and,
2. Retroactive offenders who fall within categories identified in section 487.055 of the *Criminal Code*. (Please see explanatory notes for Table 5 on page 21). This would include offenders convicted of multiple murders or sexual offences before the *DNA Identification Act* went into effect in June 2000. Convicted criminals designated as dangerous offenders prior to this date are also included.

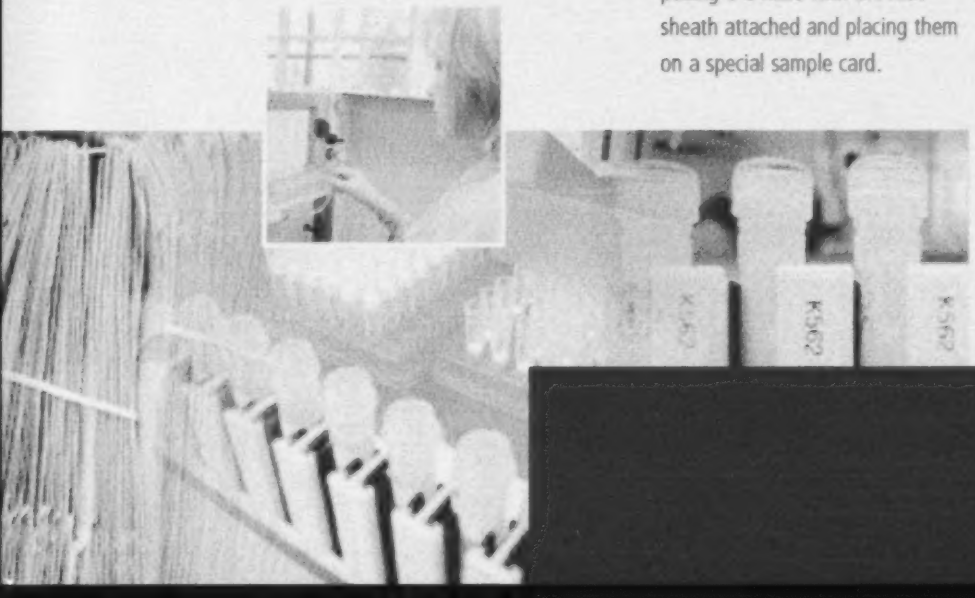
The **Crime Scene Index (CSI)** is a separate electronic database composed of DNA profiles obtained from crime scene investigations of the same designated offences.

Thousands of police officers across Canada have been trained to collect biological samples from convicted offenders that are then forwarded to the National DNA Data Bank for DNA analysis. Biological samples can be collected in three ways:

1. **Blood.** The sample is obtained by pricking the fingertip with a sterile lancet and collecting bloodstains on a specially prepared sample card.
2. **Buccal.** The sample is obtained by rubbing the inside of the mouth with a foam applicator to obtain skin cells that are then transferred to the sample card.
3. **Hair.** The sample is obtained by pulling 6-8 hairs with the root sheath attached and placing them on a special sample card.

The Convicted Offender biological samples (blood, buccal or hair) are collected across Canada and are processed into DNA profiles at the National DNA Data Bank. The information is entered into "CODIS" (Combined DNA Index System), a software package that stores and compares DNA profiles. CODIS was developed by the FBI and the U.S. Department of Justice and provided to the NDDB at no cost. This software program provides a universally accepted standard for forensic laboratories to compare DNA results.

The Crime Scene Index samples are processed from biological evidence collected at crime scenes as forensic casework by the three public forensic laboratory systems in Canada: RCMP Forensic Laboratory Services (Vancouver, Edmonton, Regina, Winnipeg, Ottawa and Halifax); Laboratoire de sciences judiciaires et de médecine légale (Montréal, Québec); and, the Centre of Forensic Sciences (Toronto, Ontario).



The National DNA Data Bank retains an electronic index of the DNA profile data from the crime scene along with basic details such as the date, location of the donor laboratory and a unique number identifier that allows information to be compared by the donor laboratory in the event of a future match.

It is important to realize that both crime scene samples and convicted offender samples are identified simply by a bar code number. In fact, the process separates the donor identity of the convicted offender from the genetic information at the time the sample arrives at the NDDB. A bar code number links the personal information to the DNA sample. This link is protected information that is not accessible by NDDB staff and is kept in a separate registry by the RCMP's Canadian Criminal Records Information Service (CCRIS).

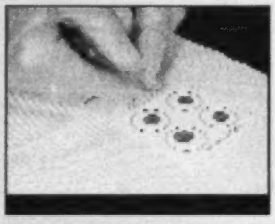
The DNA profiles obtained from either convicted offender samples or crime scene samples are the result of 13 special DNA tests that collectively produce a DNA profile, unique to each individual.

Canadian law makes it very clear that the NDDB profiles can only be used for law enforcement purposes. The regions of interest that Canadian forensic scientists use for profiling are considered anonymous pieces of DNA and, apart from gender, do not specify any medical or physical information about the donor. The 13 core tests or "loci" chosen for forensic analysis in Canada are the same regions of genetic variation used throughout the United States and in many other countries using forensic DNA analysis.

DNA PROCESSING

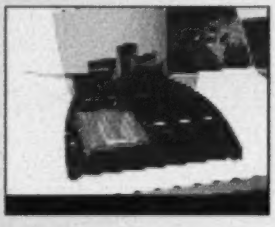
1.
Blood (or buccal or hair) sample collected by police officer.

2.
Blood spotted on FTA® collection card.

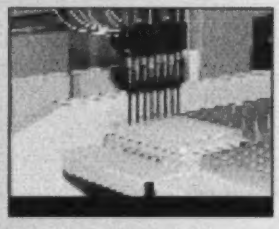


3.
Donor identity checked by fingerprints.

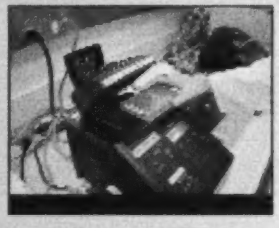
4.
Sample plate bar coded and prepared.



5.
1.5mm disk punched from sample cards into each of 96 wells on plate.

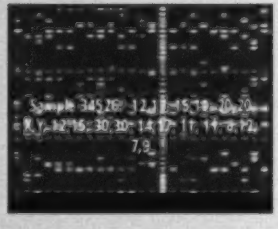


6.
Multiple DNA samples simultaneously processed using robots.

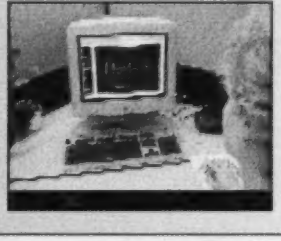


7.
DNA fragments of interest are labeled with a fluorescent marker and amplified.

8.
DNA analyzed using a DNA sequencer.



9.
13 different DNA tests analyzed and then profile simplified to a series of numbers.



10.
DNA profile entered into CODIS and matched against other profiles.

CODIS DIAGRAM

VANCOUVER | EDMONTON | REGINA | WINNIPEG | TORONTO | OTTAWA | MONTRÉAL | HALIFAX

DNA profiles from regional crime scenes

Foreign requests are made through International DNA Agreement with Interpol Ottawa

National DNA Data Bank - Ottawa

RCMP International Exchange Services

Convicted Offender Index

Crime Scene Index

Matches are conveyed through CODIS

•

Crime Scene to Crime Scene matches are reported directly to regional forensic laboratories using CODIS

•

Convicted Offender to Crime Scene matches are conveyed through Criminal Records at which time the identity of the individual is disclosed to the forensic laboratory which then informs the investigator.

KEY STATISTICS

(for the period from May 15, 2003 to May 14, 2004)

TABLE 1	CASES ASSISTED BY THE NDDB
Murder	131
Sexual Assault	336
Attempted Murder	47
Robbery (armed)	259
Break and entering with intent, committing offence or breaking out	971
Assault (+)	101
Other	27
TOTAL	1,872

TABLE 2	MATCH INVENTORY REPORT
Offender Hits	1872
Forencis Hits	182
Offender Duplicate	1469
Identical DNA profiles, but from different individuals (i.e. identical twins)	26

Explanatory Notes

An **offender "hit"** occurs when a DNA profile developed from a biological sample from a crime scene is sent to the NDDB and it matches an individual's DNA profile included in the NDDB's Convicted Offender Index.

A **forensic "hit"** occurs when a crime scene DNA profile is sent to the Crime Scene Index of the NDDB and matches that from at least one other crime scene included in the NDDB's Crime Scene Index.

Offender duplicate refers to cases where two samples from the same person were submitted to the NDDB.

Identical DNA profiles but different individuals (Identical twins) refers to the DNA profiles of 26 sets of identical twins that are contained in the NDDB's Convicted Offender Index.

TABLE 3	DNA PROFILES ENTERED INTO THE NDDB
Entered into the Convicted Offender Index	59,008
Entered into the Crime Scene Index	14,735
TOTAL	73,743

Note: The NDDB receives 350 to 450 convicted offender samples per week.

Explanatory Notes

Convicted Offender Profile: A DNA profile from an offender who was convicted of a designated offence (e.g. homicide, sexual assault, assault with a weapon, etc.). For a complete list of primary offences, see Appendix A; for secondary offences, see Appendix B.

Crime Scene Profile: A DNA profile derived from a biological substance left at the scene of a crime.

TABLE 4	CRIME SCENE INDEX PROFILES RECEIVED
Laboratoire de sciences judiciaires et de médecine légale (Montréal)	4,326
Centre of Forensic Sciences (Toronto)	5,976
RCMP Forensic Laboratory Services (Vancouver, Edmonton, Regina, Winnipeg, Ottawa, Halifax)	4,433
TOTAL	14,735

TABLE 5	CONVICTED OFFENDER SAMPLES RECEIVED		
Retroactive	1,761	Primary	33,245
Retrospective	29,002	Secondary	27,990
Prospective	30,831	Non-designated	359
TOTAL	61,594		

Alberta	5,838	Nunavut	294
British Columbia	5,831	Ontario	28,990
Manitoba	3,727	Prince Edward Island	122
New Brunswick	881	Quebec	10,226
Newfoundland	914	Saskatchewan	2,784
Nova Scotia	1,427	Yukon	123
North West Territories	437		

Explanatory Notes

The **Convicted Offender Index** is a post-conviction database composed of three categories of samples.

Retroactive: A sample taken from an offender who was found guilty of a designated *Criminal Code* offence before June 30th, 2000 and who 1) had been declared a dangerous offender, 2) was convicted of more than one murder committed at different times, or 3) was convicted of more than one sexual offence, and on June 30th, 2000 was serving a sentence of at least two years for one or more of those offences.

Approximately 2,243 offenders were identified on the retroactive offenders list (as of March 22nd, 2004). All of these offenders have been processed and their certified criminal history forwarded to provincial/territorial Attorneys General. A total of 1,962 of these files have been concluded, with the remainder being prepared by the Attorneys General for court applications.

Retrospective: A sample taken from an offender who committed a designated offence before June 30th, 2000 and was convicted after that date.

Prospective: A sample taken from an offender who committed and was convicted of a designated offence after June 30th, 2000.

Primary Offences (see Appendix A)

Secondary Offences (see Appendix B)

Non-designated: A sample taken from an offender who (1) was convicted of an offence that is not a primary or a secondary designated offence, or (2) does not belong to one of the categories of offenders set out in the retroactive scheme.

Samples Received versus Profiles Entered

As of May 14th, 2004, the NDDB had received 61,594 biological samples and from these samples 59,008 DNA profiles were entered into CODIS. This difference (2,586) can be attributed to the rejected samples (see Table 7), the duplicate samples (see Table 2) and the DNA samples in process.

TABLE 6	TYPE OF DATA BANK SAMPLES RECEIVED FROM CONVICTED OFFENDERS	
Blood	60,494	98.2%
Buccal	1,018	1.7%
Hair	82	0.1%
TOTAL	61,594	

In some instances, samples had to be taken a second time, pursuant to subsection 487.091(1) of the Criminal Code, which provides for an application for resampling where a DNA profile can not be derived from the original sample. Since June 30th, 2000, the NDDB has received 87 samples that were taken under this provision.

TABLE 7	SAMPLE REJECTIONS	
Non-designated offences		359
Biological samples inadequate		67
Wrong kits		110
Sample retake - requested by lab		1
Others		170
TOTAL	1.1%	707

Note:

These figures do not include sample kits submitted without fingerprints. Typically, if an affidavit from the collection officer is provided at a later date, continuity is established and the samples can be accepted. Since June 30th 2000, the NDDB has received 477 sample kits that did not contain fingerprint information on the sample collection card or the fingerprint identification form. In some instances, samples had to be taken a second time using the provision provided by the *DNA Identification Act* using form 5.09.

Approximately one per cent of samples cannot be accepted by the National DNA Data Bank for the reasons listed above.

TABLE 8	BREAKDOWN OF CONVICTED OFFENDER SAMPLES RECEIVED
Young Offenders	8,784
Adult Offenders	52,787
Military Offenders	23
TOTAL	61,594

TABLE 9	CONVICTED OFFENDER INDEX BREAKDOWN OF OFFENCES
Homicide	1,399
Sexual Assault	10,470
Break and Enter/Robbery	18,342
Assault	37,234
Other	3,893

Explanatory Notes

The **Homicide** category includes manslaughter.

The **Sexual Assault** category includes rape, sexual intercourse with a female under 14 and between 14 and 16, sexual intercourse with the feeble-minded, sexual interference, invitation to sexual touching, sexual exploitation, incest, bestiality in the presence of or by a child, child pornography, indecent acts, offence in relation to juvenile prostitution, sexual assault with a weapon, and aggravated sexual assault.

The **Break & Enter/Robbery** category is limited to the two offences.

The **Assault** category includes assault with a weapon or causing bodily harm, aggravated assault, and assaulting a peace officer.

The **Other** category includes using explosives, causing death by criminal negligence, causing bodily harm by criminal negligence, causing bodily harm with intent, dangerous operation causing bodily harm, dangerous operation causing death, failure to stop at the scene of an accident, impaired driving causing bodily harm, impaired driving causing death, unlawfully causing bodily harm, kidnapping, hostage taking, mischief causing danger to life, arson - disregard to human life, setting fire to other substance, arson - own property.

TABLE 10	SAMPLES/PROFILES REMOVED FROM THE DATA BANK
Conviction quashed on appeal	15
Authorization quashed	1
Judge ordered destruction of sample	1
Rejected contaminated sample	2
Rejected original from non-designated offence	2

FINANCIAL STATEMENT

EXPENDITURES – 2003/04 FISCAL YEAR

COST DRIVER	EXPENDITURES *($ thousands)*
Personnel	1,440
Transport and communications	74
Information	16
Professional and special services	80
Rentals	4
Repair and maintenance	75
Utilities, etc.	806
Capital and minor etc.	115
TOTAL	2,610

MESSAGE FROM THE NATIONAL DNA DATA BANK ADVISORY COMMITTEE

Members of the National DNA Data Bank Advisory Committee were appointed in 2000 by the then Solicitor General of Canada. Considered fundamental to the operation of the Data Bank, the Committee operates at arms length from government and the Royal Canadian Mounted Police. It reports annually to the Commissioner of the RCMP.

Committee members have expertise in policing, privacy, molecular biological sciences, genetics, medical ethics and the law. In meeting their mandate, they must balance the requirements of the *DNA Identification Act* regarding privacy, legal, ethical and human rights with the latest scientific developments in the application of DNA identification for law enforcement purposes.

Overall the Advisory Committee remains very pleased with the operations of the NDDB and the effective collaboration with forensic laboratories, police and justice partners. Clearly, this integrated approach is having a positive impact on the administration of justice in Canada. The Data Bank staff is exceptional and continues to find ways to make this world-class facility even more efficient. Hit rates continue to climb which means, of course, that this program is helping to solve an ever-increasing number of serious crimes.

Over the 2003-04 fiscal year, the Advisory Committee has focused much of its attention on ways to increase the efficiency of the Data Bank through technology.

One of the most exciting new developments is magnetic bead technology. It allows for quicker extraction of biological samples and the rapid

transfer to automated robotics that move the samples more efficiently through processing.

The Committee remains committed to encouraging further increases in the number of samples supplied to the NDDB for uploading. Given the direct correlation between the volume of samples loaded into the NDDB and the number of "hits," we must continue to support the law enforcement and legal communities to take full advantage of the opportunities that exist.

Based on a previous Consulting and Audit Canada assessment, the number of such DNA data bank orders is only half of what was anticipated when the legislation was passed. Consequently, we will again make education a priority and encourage an increase in the number of convicted offender samples, as permitted under the *DNA Identification Act*.

To that end, we have entered into an agreement with the National Justice Institute to provide additional resource materials and presentations to Canadian judges and prosecutors and to assist wherever possible.

In addition, we will continue to advise the Commissioner of the RCMP and the new Department of Public Security and Emergency Preparedness on new programs such as the possible establishment of a Missing Persons Index. In December, 2003, the Advisory Committee, at the request of the Minister and the Commissioner, was invited to undertake a preliminary review of some of the issues facing the development of such an index. Members of the Committee endorsed the idea as a significant contribution to Canadians. The Committee found there were no significant obstacles to housing such an index within the National DNA Data Bank as an extension of its current mandate and operational responsibilities following appropriate consultation and legislative review. We are aware that the government continues to consider this issue, in consultation with provinces and territories.

More information on the Advisory Committee and a copy of their annual report may be obtained at: **rcmp-grc.gc.ca/dna_ac/index_e.htm.**

MEMBERS OF THE NATIONAL DNA DATA BANK ADVISORY COMMITTEE

Richard A. Bergman
Chairperson

Hon. Peter deCarteret Cory, C.C., C.D., Q.C.
Representing the Law

Raymond D'Aoust
Representing the Privacy Commissioner

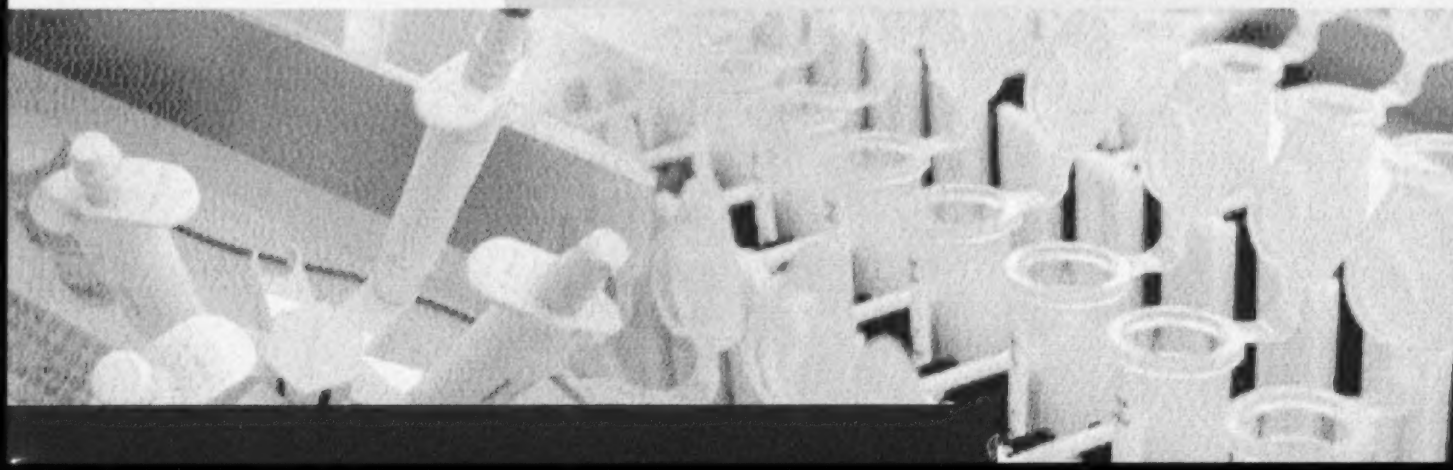
Dr. George R. Carmody
Vice-Chairperson

Gisèle Côté-Harper O.C., Q.C.
Human Rights Specialist

Dr. Ron Fourney
Representing the National DNA Data Bank

Dr. Frederick R. Bieber
Bio-Medical Ethics Specialist

Dr. William S. Davidson
Medical Genetics Specialist



MESSAGE FROM THE OFFICER-IN-CHARGE OF THE NATIONAL DNA DATA BANK

Dr. Ron Fourney
Officer-in-Charge,
National DNA Data Bank of Canada

Looking Back to Look Forward

Reviewing the annual report gives me an opportunity to take a step back to consider where we started, how far we have come, and what the future holds.

It's quite remarkable to think that it was just 15 years ago when forensic DNA evidence was first used to secure a conviction in a Canadian court. Today, not only is DNA evidence well accepted but it is widely recognized as one of the most important investigative tools ever discovered.

After just four years in operation, the National DNA Data Bank's track record is excellent and continues to prove its worth on a daily basis.

Consider the results:

Working with police investigators and partner laboratories, Data Bank scientists have provided investigative leads in more than 1,800 criminal cases.

That number includes more than 125 murders, 330 sexual assaults, 257 armed robberies and almost 950 break and enters.

Just as important, forensic DNA evidence used as the silent witness in an unbiased and scientific capacity has focused investigations and eliminated thousands of potential suspects. This is an obvious benefit in protecting the innocent and society but it also represents a direct benefit to police who must respond quickly and can ill afford to waste valuable resources on dead end leads.

As a truly national service that works in partnership with our operational forensic laboratories across Canada, the Data Bank has linked evidence from more than 1,800 crime scenes to known, convicted offenders, from coast to coast, in small isolated communities and in large urban centres.

It has also provided key information for more than 175 "serial" cases in which the same offender is linked to multiple crime scenes.

For police, these Data Bank "hits" are often a new beginning for an old case or the break they have been hoping for, either confirming the investigators' suspicions or sending the investigation in an entirely different, more productive, direction which was previously unanticipated.

Consistent Feedback

I am further encouraged by the consistency of opinion and observation across the law enforcement and justice communities. Over and over, we hear the same messages:

- That the Data Bank is working;
- That greater use of automation and innovative new scientific developments are translating into even better results; and,
- That there is every reason to feel optimistic about the future and even greater success.

Integrating new, advanced technology is making a big difference in our day-to-day operations. The key factors are speed and enhanced sensitivity

but at all times with no compromise in quality or reliability. In particular, with automation, we are able to extract and process DNA much quicker and from more challenging samples. Simply put, we can achieve much more with much less in a shorter period of time.

Encouraging a steady increase in the number of samples entering the Data Bank remains our number one priority because of the direct link to the number of hits we can generate. As one rises, so too will the other.

Consider the fact that between May 15th, 2003 and May 14th, 2004, there was a 50 per cent increase in the number of profiles entered into the two Data Bank indices. Those additional profiles boosted the number of offender hits by a remarkable 140 per cent!

Reason for Optimism

When all is said and done, there is much to celebrate after four years of operation. With police agencies across Canada stretching limited resources as never before, Data Bank hits are helping to steer investigators in productive directions. The interaction between the National DNA Data Bank and police serves as a model of integrated policing and effective partnerships.

At the community level, there is comfort and reassurance in the fact that the Data Bank has played a key role in helping to solve many serious crimes including murders and sexual assaults.

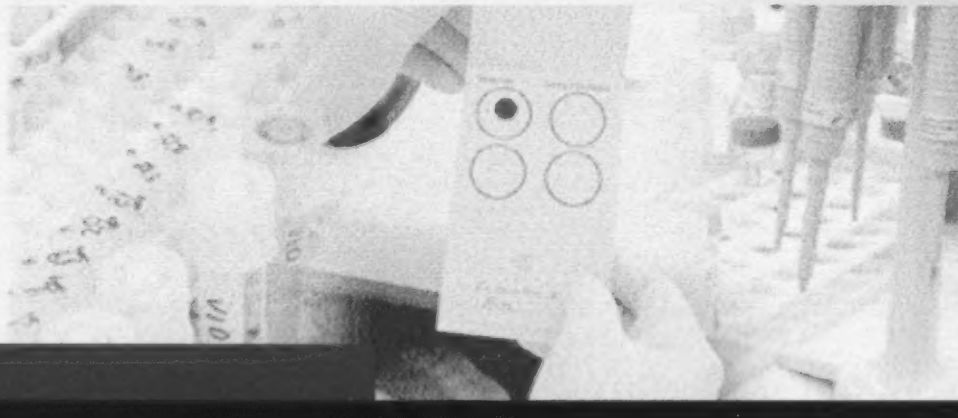
Perhaps most encouraging is hearing how the end product of our science has reached back in time to solve old cases or assisted in ongoing investigations.

Some observers believe that our work has an impact on the future as well. For example, Alberta Provincial Court Judge, Bruce Fraser, believes that DNA profiling is becoming a deterrent to repeat offenders. When he orders a convicted offender to provide a biological sample so that a profile can be generated and entered in the Data Bank, the outcome is compelling:

"I tell the offender that his DNA profile will be in the Data Bank for the rest of his life," says Judge Fraser. "If he commits another crime where DNA is left at the scene, he'll be identified." *(See "From the Bench," page 37)*

Overall, we have just started to scratch the surface. With increases in the number of samples, further enhancements to automated systems, and our commitment to assist globally through international agreements, the success rates will climb dramatically.

I look forward to future annual reports, when we can talk about the thousands of serious crimes being solved every year and the tangible ways in which our work is helping to make Canadian communities safer.



APPENDIX A

LIST OF PRIMARY OFFENCES – CRIMINAL CODE

	OFFENCE	SECTION
1	Approaching, entering, etc., a prohibited place	6 SIA*
2	Threats or violence	(20)(1) SIA*
3	Harboring or concealing (Security of Information)	(21)(1) SIA*
4	Piratical acts	75
5	Hijacking	76
6	Endangering safety of aircraft or airport	77
7	Seizing control of ship or fixed platform	78.1
8	Using explosives	81(1)
9	Participation in activity of terrorist group	83.18
10	Facilitating terrorist activity	83.19
11	Commission of offence for terrorist group	83.2
12	Instructing to carry out activity for terrorist group	83.21
13	Instructing to carry out terrorist activity	83.22
14	Harboring or concealing (Terrorism)	83.23
15	Sexual interference	151
16	Invitation to sexual touching	152
17	Sexual exploitation	153
18	Incest	155
19	Offence in relation to juvenile prostitution	212(4)
20	Infanticide	233
21	Murder	235
22	Manslaughter	236
23	Causing bodily harm with intent	244
24	Assault with a weapon or causing bodily harm	267
25	Aggravated assault	268
26	Unlawfully causing bodily harm	269
27	Sexual assault	271
28	Sexual assault with a weapon, threats to a third party or causing bodily harm	272
29	Aggravated sexual assault	273
30	Kidnapping	279
31	Hostage taking	279.1
32	Attack on premises, residence or transport of internationally protected person	431
33	Attack on premises, accommodation or transport of United Nations or associated personnel	431.1
34	Explosive or other lethal device	431.2(2)
	As they read from time to time before January 4, 1983:	
35	Rape	144
36	Sexual intercourse with female under fourteen and between fourteen and sixteen	146
37	Sexual intercourse with feeble-minded, etc.	148
	As it read from time to time before January 1, 1988	
38	Sexual intercourse with step-daughter, etc.	153.1(a)

APPENDIX B

LIST OF SECONDARY OFFENCES – CRIMINAL CODE

	OFFENCE	SECTION
1	Bestiality in the presence of or by child	160(3)
2	Child pornography	163.1
3	Parent or guardian procuring sexual activity	170
4	Indecent acts	173
5	Causing death by criminal negligence	220
6	Causing bodily harm by criminal negligence	221
7	Dangerous operation causing bodily harm	249(3)
8	Dangerous operation causing death	249(4)
9	Failure to stop at scene of accident	252
10	Impaired driving causing bodily harm	255(2)
11	Impaired driving causing death	255(3)
12	Assault	266
13	Torture	269.1
14	Assaulting a peace officer	270(1) (a)
15	Robbery	344
16	Breaking and entering with intent. committing offence or breaking out	348(1)
17	Mischief that causes actual danger to life	430(2)
18	Arson – Disregard for human life	433
19	Arson- Own property	434.1
	As they read from time to time before July 1, 1990:	
20	Arson	433
21	Setting fire to other substance	434

Note: *An attempt to commit or, other than for the purposes of subsection 487.05(1), a conspiracy to commit any of the offences mentioned in the above list is also considered a secondary designated offence.*

< **SIA: Security of Information Act*

Note: *An attempt to commit or, other than for the purposes of subsection 487.05(1), a conspiracy to commit any of the offences mentioned in the above list is also considered a primary designated offence.*

Generating hits. Ultimately, that's the goal for scientists at the National DNA Data Bank.

In nearly four years of operation, there have been 1,872 Data Bank hits linking DNA evidence from a crime scene with a convicted offender.

In addition, there have been 182 other cases where a crime-scene-to-crime-scene hit has linked the same perpetrator to more than one offence.

Why are these hits so important? Because each one brings police that much closer to solving a difficult case. In some instances, DNA evidence is the critical factor that leads to a conviction in court.

On the following pages, you'll read about several such cases, where the work of the Data Bank scientists has helped to solve a serious crime or produce solid new leads in a case that's gone cold.

In the first case, Data Bank scientists were able to link two seemingly unrelated crimes that led to a sophisticated police sting operation and the arrest of a violent criminal.

The second story highlights how the work of the Data Bank has had a dramatic impact on the direction of three different investigations, opening new avenues when police have reached a dead end.

CASE STUDY 1

DNA LINK LEADS TO LIFE SENTENCE

It was her first overnight shift behind the counter at Big Ben's convenience store. Tragically, it was also her last.

Marie Lorraine Dupe, 46, was stabbed to death in Sydney, Nova Scotia, on March 22, 1992. The killer used a 30-centimetre store knife to stab the victim dozens of times. As she lay bleeding to death on the floor, he snatched $300 from the cash register and two cartons of cigarettes. His escape on foot in a blinding snowstorm made it impossible for police dogs to follow the trail.

There were other leads – several cigarette butts and a used coffee cup – but forensic science was not far enough advanced to extract useful samples for DNA analysis.

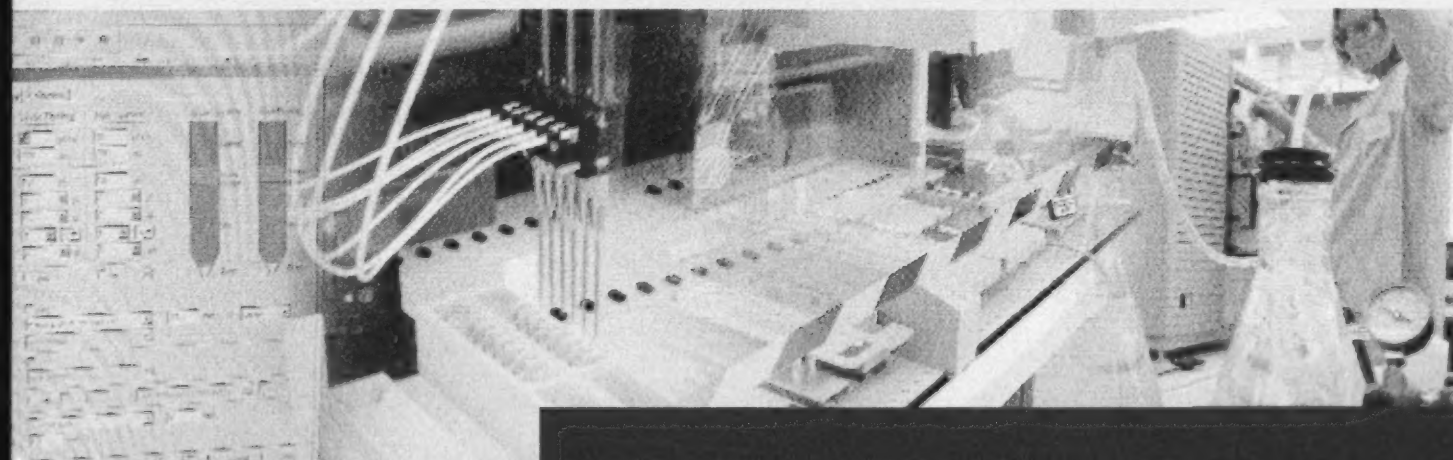
Local police conducted a massive investigation, interviewing 200 people, but the murder remained unsolved for more than a decade. With every lead exhausted, frustrated police, along with the family and friends of the victim, could only hope for a break in the case.

By January 2001, technology had progressed far enough to allow authorities to establish a DNA profile from the items carelessly discarded at the scene of the crime. The profile was added to the National DNA Data Bank. Eventually, that would be the critical link leading to a conviction in Nova Scotia Supreme Court and a mandatory life sentence.

In a totally unrelated case nine years after the murder – and hundreds of kilometres from the scene of the horrific crime – an Ontario court convicted 28-year-old Ernest Gordon Strowbridge of assault causing bodily harm. The judge, citing a relatively new section of the Criminal Code, ordered Strowbridge to provide a biological sample for the purposes of forensic DNA analysis. The resultant profile was entered into the National DNA Data Bank. It generated a "hit" with a profile from the DNA on one of the cigarette butts found at the scene of the Big Ben's murder.

That discovery led to Project Phoenix, an elaborate undercover operation spearheaded by the Ontario Provincial Police (OPP), in close collaboration with Cape Breton Regional Police who now had renewed hope that Marie Lorraine Dupe's killer may have been found.

In a carefully planned operation, the OPP arrested Strowbridge in July, 2001 on an outstanding warrant for possession of stolen goods. An undercover officer, posing as another



prisoner, befriended Strowbridge as they were transported in a police van.

After the two were released from custody, the officer asked if Stowbridge would be interested in making some quick money. Over the next several weeks, Stowbridge was involved in several vehicle thefts that were actually orchestrated by police.

Eventually, he was given the opportunity to meet with the crime boss to interview for a job with the organization. The meeting took place in a Toronto hotel, with a hidden police video camera capturing every word.

Eager to impress the boss, Strowbridge volunteered the gory details of the 1992 stabbing in Sydney.

"I got drinking Kelly's wine, back in Nova Scotia 10 years ago," he tells the undercover officer, "and I did that Big Ben's murder. I didn't realize I done it until the next day....maybe she didn't serve me or something. I don't know. Maybe she was rude to me, laughed in my face. The next thing I know I'm over her, jabbing her."

The videotape, combined with powerful DNA evidence, led to a trial in Nova Scotia. The court heard that the odds of his DNA matching that of another male were one in 1.5 trillion.

Faced with overwhelming evidence against him, Strowbridge pleaded guilty to second degree murder and received the mandatory sentence of life imprisonment.

The presiding judge was emphatic about the importance of the DNA evidence. "We live in a new time in the criminal justice system," noted Justice Joseph Kennedy. "So-called cold cases are now coming before the courts ... because there have been remarkable developments in the DNA process."

CASE STUDY 2

DATA BANK HITS FIRE UP COLD CASES IN TORONTO

Police describe him as "evil and dangerous." He's the suspect in a sexual assault case that has frightened and angered a close-knit Toronto neighbourhood.

On March 5th, 2002, a seven-year-old girl and a friend were walking down a hallway at Holy Name Catholic School. Without warning, the girl was grabbed by the arm and pulled into a school washroom where she was sexually assaulted. The assailant escaped.

The disturbing attack was front page news and sent ripples of fear throughout the community. Toronto police conducted an exhaustive investigation, following up on hundreds of leads.

With little more than the eye witness testimony of two 7-year-olds, investigators theorized that the attacker was likely a transient who had chosen the school at random.

Having pursued every viable lead, police could do little more to advance their investigation and could only hope for a break in the case.

"As often happens, DNA produced a critical link that has completely changed our theory about the school assault and injected new life into a cold file," says Detective Brian Borg, who heads up the Toronto Police Sexual Assault Unit's Cold Case Squad, a three-member unit with a caseload of 300 unsolved crimes.

A semen sample collected at the crime scene was sent to Toronto's Centre of Forensic Sciences where forensic scientists produced a DNA profile that was then submitted to the National DNA Data Bank in Ottawa. The profile generated a "hit" on the Crime Scene Index. It matched with genetic material collected from a sexual assault in 1990 when a 20-year-old woman was raped at gunpoint in her office.

For police, the most compelling aspect of the match was the fact that this afternoon attack had taken place in the same neighbourhood as the school assault.

"The two cases are at opposite ends of the spectrum," according to lead investigator, Detective Sandy O'Grady. "They couldn't be more different. The only thing linking them is the DNA the attacker left behind. Without it, these cases would never have been put together."

A New Theory

The Data Bank hit inspired police to combine the evidence from both cases, including the composite drawings based on descriptions from the two victims.

"What we thought were random attacks have now been linked," notes Detective Borg. "The fact that the two assaults are twelve years apart suggests we're likely dealing with someone who knows the neighbourhood well and who may be known to residents. This is a huge break for us."

The case remains unsolved and police continue to make repeated calls for the public's help because the likelihood of further attacks is high.

"How the offender has progressed to now sexually assaulting a seven-year-old in a school washroom is unknown to us," says Detective O'Grady. "But the science tells us this is the same person."

DNA evidence has also helped to clear more than 200 suspects who volunteered biological samples, but whose DNA profiles didn't match that of the perpetrator.

"That part has been what's surprised us the most – the terrific co-operation of people we've taken DNA from," remarks Detective Constable Doug Ward. "If you didn't do the crime and believe in the science – which is bulletproof – why not?"

DNA Shines Light on Baffling Murder

This case is just one of dozens of examples that the Toronto Cold Case Squad points to as evidence of the power of DNA evidence.

"You won't find stronger supporters of the National DNA Data Bank anywhere," adds Detective Borg. "While we haven't yet solved all of our cold cases, DNA evidence has linked assaults that we would have never even considered. The Data Bank hits are a real shot in the arm for frustrated investigators and, more importantly, for the victims and their families."

Citing another example, Detective Borg explains that a Data Bank match, linking genetic material at two different crime scenes, has produced a vital piece of evidence in an unsolved Toronto murder.

"Last summer, a sex trade worker was murdered and our initial investigation

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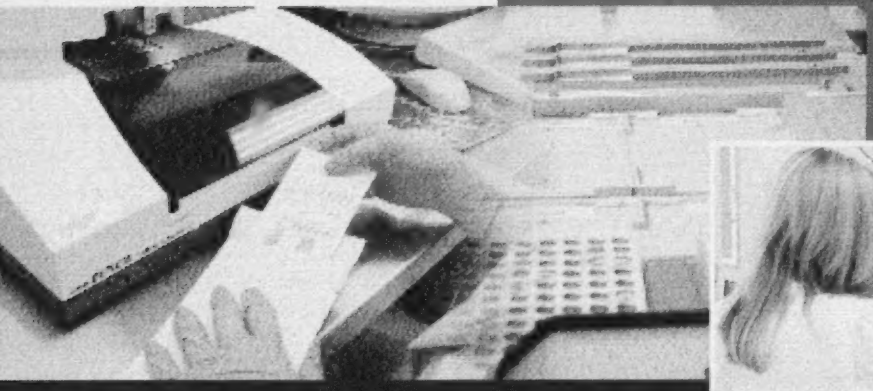


turned up almost nothing about the killer," notes the Toronto detective.

A DNA profile was generated from samples taken from the crime scene and submitted to the National DNA Data Bank's Crime Scene Index. A hit on the system linked this case to a 1997 sexual assault on another prostitute.

"With this new lead, we went back to the '97 case and found a physical description of the attacker," explains Detective Borg. "This is a critical piece of evidence we didn't have before. We've re-opened the investigation and are much more hopeful that we'll find the perpetrator."

Solving Armed Robberies through DNA

Detective Borg is quick to point out that DNA evidence can be vital in cracking cases other than murders and assaults. He notes that a Data Bank hit has also uncovered a key piece of evidence in a string of armed robberies dating back to December 2002.

"A group of suspects would enter a restaurant just before closing and order a meal," explains Detective Borg. "Once the place had closed down and the other patrons had left, they'd rob the place."

And the critical piece of DNA evidence?

"One of the suspects had a beer," adds Detective Borg. "The Toronto lab was able to generate a DNA profile from saliva on the glass which produced a Data Bank link to an old sexual assault case. This is an important piece of the puzzle and it's moving the investigation in a very positive direction."

Vital Tool that Works

As the head of a small unit with 300 difficult cases, Detective Borg emphasizes the value of DNA in helping to make the most of limited resources – pursuing the best leads and eliminating the innocent. He's convinced the Data Bank has caused a dramatic evolution in the way police investigate serious crime.

"For us, it boils down to enhancing public safety," he says. "As far as the Data Bank is concerned, from a very practical perspective – it works."

For us, it boils down to enhancing public safety. As far as the Data Bank is concerned, from a very practical perspective – it works.

FROM THE BENCH

Bruce Fraser, an Alberta Judge and former crown prosecutor, has witnessed first hand the remarkable impact of forensic DNA profiling on criminal trials. Through dozens of cases, he has come to recognize the strength of DNA evidence to convict the guilty and exonerate the innocent. Moreover, he believes that DNA is starting to act as a deterrent to repeat offenders.

Judge Fraser calls DNA "the most important investigative tool ever discovered – even more important than fingerprints. Quite simply, DNA evidence – when properly handled and properly profiled – offers fool-proof evidence."

His enthusiasm extends to the National DNA Data Bank as well, which he believes is putting the science to its best possible use. Through experience, Fraser has gained an appreciation for the role of the NDDB in creating links between crime scenes and identifying offenders.

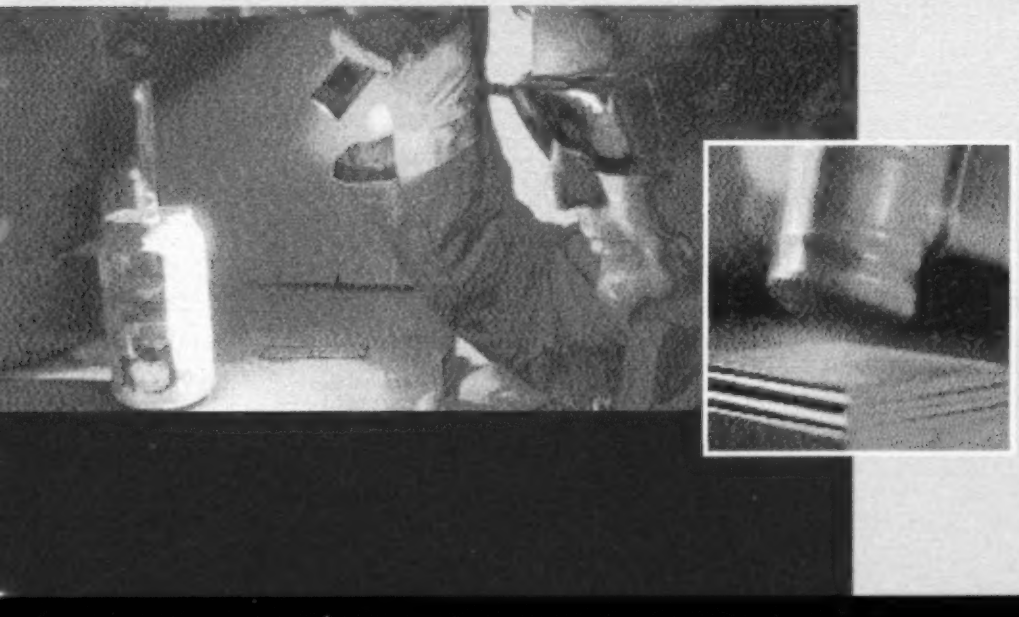
"And the impact will only intensify as the Data Bank receives more and more samples," he notes. "And for judges and crown prosecutors, ordering those samples is where we've really got to focus our efforts. If there's one weakness in the system right now, it's the missed opportunities to order convicted offenders to submit a blood sample that can be profiled and sent to the Data Bank."

Over its four years of operation, the NDDB has received far fewer samples than expected. In fact, in cases where an offender has been convicted of a primary offence (see Appendix A) and the law requires that a sample should be ordered, judges are only doing so in about half the cases.

"For the other half, these are lost opportunities to link convicted offenders to other crimes," says Fraser. "In our jurisdiction in Alberta, these orders are now automatically considered in every relevant case."

The Alberta Judge often cites the so-called Desjarlais case as evidence of the power of the NDDB and the

Photo : Roxanne Ouellete, RCMP



importance of ordering samples from convicted offenders.

The case dates back to 1994 and an Alberta park. A young mother out for a morning walk was grabbed, dragged behind some bushes, and raped. The victim was taken to hospital where a sexual assault kit was used to collect a sample of the attacker's DNA.

Police had few leads and the case went cold.

When federal legislation was passed in December 1998 to create the National DNA Data Bank, Edmonton City Police asked to have the DNA sample submitted and the profile added to the Crime Scene Index.

About two years later, Charles Henry Desjarlais was convicted of sexual interference of a child. Citing the new legislation, the judge in the case ordered Desjarlais to provide a blood sample which was then profiled for DNA and submitted to the NDDB's Convicted Offender Index.

The sample generated a "hit" with the 1994 Edmonton rape and the information was immediately forwarded to the city police. After the victim positively identified Desjarlais in a photo line-up, police obtained a warrant for a blood sample. The resultant DNA profile matched the one from 1994.

Desjarlais was charged with sexual assault and pled guilty on the strength of the DNA evidence. He was sentenced to the maximum of 10 years in prison, less three years for the guilty plea.

"The only positive thing to come out of these brutal attacks," states Fraser, "is that the Data Bank legislation worked to perfection. And it worked, in large part, because the judge in the sexual interference case ordered Desjarlais to submit a blood sample. I like to talk to my colleagues on the bench about this case because it confirms why we should be placing these orders whenever we can."

Fraser is optimistic about the future, particularly if judges order samples from convicted offenders as often as the law will allow. The number of Data Bank hits will climb as more and more profiles are added.

"And there's another tremendous benefit that comes from ordering the samples," he adds. "I tell the offender that his DNA profile will be in the Data Bank for the rest of his life. If he commits another crime where DNA is left at the scene, he'll be identified. You should see the look on the offender's face. When I put it in those terms, I think he gets it."